

IN THE CLAIMS

Claims 1-33 (Cancelled)

Claim 34 (New) A device for mixing and regulating the output temperature of a hot liquid and a cold liquid, comprising:

a mixing chamber;

a hot liquid entry port into said chamber;

a first cold liquid entry port into said chamber;

an outlet from said chamber;

an outlet passage in communication with said outlet of said chamber;

flow control means within said chamber for altering the proportions of hot and cold liquids admitted through said entry ports into said chamber at any rate of combined output flow;

a temperature sensing device adapted to sense the temperature of the output of the mixed liquids from the chamber for controlling the flow control means so that the output temperature at all output flow rates from the chamber does not exceed a selected maximum temperature, characterized in that the device further comprises a second cold liquid entry port controlled by the flow control means which communicates with the output passage of the device downstream from where the temperature of the output flow from the chamber is sensed.

Claim 35 (New) The device according to claim 34 which includes a stationary distributing member and a movable distributing member, the stationary distributing member having ports for the supply of hot liquid and cold liquid to the movable distributing member, wherein the movable distributing member regulates the proportions of hot and cold liquid supplied to the hot liquid entry port and to the cold liquid entry ports and the flow rates thereof,

and enables complete shut-off of all flows to said ports.

Claim 36 (New) The device according to claim 34 comprising:

a movable distributing member;

a stationary distributing member;

a body supporting the movable and stationary distributing members;

sealing means to seal between parts of the movable and stationary distributing members;

wherein the stationary distributing member comprises:

a hot liquid inlet port;

a cold liquid inlet port;

a hot liquid outlet port;

a first cold liquid outlet port;

a second cold liquid outlet port;

and wherein the movable distributing member includes:

a hot liquid transfer cavity;

a cold liquid transfer cavity;

and wherein:

the mixing chamber is a convergence space formed in the body;

the hot liquid entry port is formed in said body and communicates with said hot liquid outlet port and with said convergence space;

the cold liquid entry port is formed in said body and communicates with said first cold liquid outlet port and with said convergence space;

the flow control means is capable of regulating the flow of hot and cold liquids entering

said convergence space by opening the hot liquid entry port while closing the first cold liquid entry port and vice versa and is capable of completely closing said hot liquid entry port;

a temperature sensing portion of said temperature sensing device is located in said outlet;
said second entry port for the cold liquid communicates with said second cold liquid outlet port;
and wherein

the movable distributing member is movable to each of the following positions:

a first position where the hot liquid inlet port communicates with the hot liquid transfer cavity which communicates with the hot liquid outlet port and at the same time the cold liquid inlet port communicates with the cold liquid transfer cavity which communicates with the first cold liquid outlet port; or

a second position where the hot liquid inlet port communicates with the hot liquid transfer cavity which communicates with the hot liquid outlet port and at the same time the cold liquid inlet port communicates with the cold liquid transfer cavity which communicates with the first cold liquid outlet port and the cold liquid transfer cavity also communicates with the second cold liquid outlet port; or

a third position where the hot liquid inlet port and the cold liquid inlet port do not communicate with any outlet port.

Claim 37 (New) The device according to claim 36 wherein said movable distributing member is movable in an infinitely variable manner between said positions.

Claim 38 (New) The device according to claim 37 wherein said movable distributing member is arranged so that, in use, when moved between said first position and said second position, the flow rate from said outlet is maintained when there are substantially equal

supply pressures of hot and cold liquids.

Claim 39 (New) The device according to claim 38 wherein said movable distributing member is arranged so that, in use, when moved from said first or second positions to said third position, the flow rate from said outlet is reduced.

Claim 40 (New) The device according to claim 34 wherein said flow control means is arranged so that, in use, it may be moved into a position effecting complete closure of said first cold liquid entry port.

Claim 41 (New) The device according to claim 34 wherein the convergence space has an axis, a cylindrical wall coaxial with said axis and wherein said flow control means includes a movable member capable of moving within a cylindrical chamber defined by said cylindrical wall.

Claim 42 (New) The device according to claim 41 wherein said movable member comprises a partition across said cylindrical wall, slidable to and fro along said axis to provide a seal, and wherein an orifice is formed through said partition, said orifice providing communication between said hot and cold entry ports.

Claim 43 (New) The device according to claim 42 wherein said first cold liquid entry port communicates with said convergence space via said cylindrical wall and said partition includes a further cylindrical wall which may be positioned over said cold liquid entry port.

Claim 44 (New) The device according to claim 43 wherein said further cylindrical wall of said partition is shaped so that it forms a skirt that may be positioned over said cold liquid entry port in a position where the cold liquid entry port is completely closed so that, in use no cold liquid can then enter said convergence space.

Claim 45 (New) The device according to claim 42 wherein a hot liquid entry passage communicates with said convergence space at or adjacent an end of said convergence space via said hot liquid entry port.

Claim 46 (New) The device according to claim 45 wherein a chamber inlet port is circular in cross-section and is coaxial with said axis.

Claim 47 (New) The device according to claim 46 wherein said second cold liquid entry port includes a recess formed in said cylindrical wall lying substantially between surfaces which are normal to said axis.

Claim 48 (New) The device according to claim 42 wherein said axis is parallel to an axis about which said movable distributing member may be rotated.

Claim 49 (New) The device according to claim 42 wherein said temperature sensing device is arranged within said body so that, in use, the temperature sensing device expands in a direction along said axis on sensing an increase in liquid temperature and contracts along said axis on sensing a decrease in liquid temperature.

Claim 50 (New) The device according to claim 49 wherein said temperature sensing device includes a housing and a piston capable of expanding and contracting and thereby being moved axially to and fro with respect to said housing, coaxially with said axis.

Claim 51 (New) The device according to claim 50 wherein said piston is positioned so that it can directly contact said partition.

Claim 52 (New) The device according to claim 51 further comprising a resilient bias which biases said partition and said piston towards the most contracted position of the piston of the temperature sensing device.

Claim 53 (New) The device according to claim 52 wherein said resilient bias is a compression spring located between said chamber inlet port and said partition.

Claim 54 (New) The device according to claim 53 wherein said partition is cupped and said spring partially surrounds said piston.

Claim 55 (New) The device according to claim 49 further comprising means for protecting said temperature sensing device, said protecting means preventing pressure above a pre-determined maximum pressure from developing within said housing.

Claim 56 (New) The device according to claim 55 wherein said temperature sensing device is located in said body so that it is movable along said axis and said body is provided with a seat, and wherein said protecting means comprises a second resilient bias which biases movement of said temperature sensing device relative to said body against expansion of said piston, said second resilient bias acting to locate said temperature sensing device against said seat, so that

when a pressure within said chamber exceeds a pre-determined maximum pressure said temperature sensing device moves against the action of said second resilient bias thereby moving away from said seat.

Claim 57 (New) The device according to claim 36 wherein the movable distributing member and the stationary distributing member each comprise ceramic discs.

Claim 58 (New) The device according to claim 36 wherein the movable distributing member has a convex spherical surface and the stationary distributing member has a concave spherical surface.

Claim 59 (New) The device according to claim 36 wherein the movable distributing

member has a convex cylindrical surface and the stationary distributing member has a concave cylindrical surface.

Claim 60 (New) The device according to claim 34 wherein the device is in the form of a cartridge for a valve.

Claim 61 (New) The device according to claim 34 wherein the device is a valve and the valve further comprises a single operating lever.

Claim 62 (New) The device according to claim 34 which includes:
a movable distributing member;
a stationary distributing member;
a body supporting the movable and stationary distributing members;
sealing means to seal between parts of the movable and stationary distributing members;
wherein the stationary distributing member includes:

a hot liquid inlet port;

a cold liquid inlet port;

and wherein the movable distributing member includes:

a hot liquid transfer cavity;

a cold liquid transfer cavity;

and wherein the device further comprises the following, all wholly or partly contained in the body, or all wholly or partly contained in the moveable distributing member, or all wholly or partly contained in the stationary distributing member:

said mixing chamber which is a convergence space ;

said hot liquid entry port which communicates with said hot liquid transfer cavity and

with said convergence space;

said cold liquid entry port which communicates with said cold liquid transfer cavity and with said convergence space;

and wherein:

said flow control means is located within said convergence space and is capable of regulating the flow of hot and cold liquids entering said convergence space by opening the hot liquid entry port while closing the first cold liquid entry port and vice versa and is capable of effecting complete closure of said hot liquid inlet port;

a temperature sensing portion of said temperature sensing device is located in said outlet;

said second entry port for the cold liquid communicates with said cold liquid transfer cavity; and wherein

the movable distributing member is movable to each of the following positions:

a first position where the hot liquid inlet port communicates with the hot liquid transfer cavity which communicates with the hot liquid outlet port and at the same time the cold liquid inlet port communicates with the cold liquid transfer cavity which communicates with the first cold liquid outlet port; or

a second position where the hot liquid inlet port communicates with the hot liquid transfer cavity which communicates with the hot liquid outlet port and at the same time the cold liquid inlet port communicates with the cold liquid transfer cavity which communicates with the first cold liquid outlet port and the cold liquid transfer cavity also communicates with the second cold liquid outlet port; or a third position where the hot liquid inlet port and the cold liquid inlet port do not communicate with each other and block communication from both said hot liquid

inlet port and said cold liquid inlet port with any outlet.

Claim 63 (New) A method of mixing and hot and cold liquid and regulating the temperature of the mixture, the method comprising the steps of:

providing hot liquid into a mixing chamber via a hot liquid entry port;

providing cold liquid into the mixing chamber via a cold liquid entry port;

providing an outlet from said chamber;

providing an outlet passage in communication with said outlet of said chamber;

altering the proportion of hot to cold liquid admitted through said entry ports into said chamber at any rate of combined output flow with a flow control means within said chamber;

sensing the temperature of an output of the mixed liquids from the chamber with a temperature sensing device and controlling the flow control means so that an output temperature at all output flow rates from the chamber does not exceed a selected maximum, characterized in that the method further comprises the step of:

introducing cold liquid into an output passage of said chamber via a second entry port controlled by the flow control means downstream from where the temperature of the output flow from the chamber is sensed.